Research on the Emotional Design of Mother and Baby Rooms in Commercial Spaces Based on Three-Level Theory

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Abstract: With the increasing concern for the rights and interests of mothers and infants, this paper comprehensively analyzes the satisfaction of using mother and baby rooms in commercial spaces in Dalian based on the fuzzy comprehensive evaluation method. A satisfaction index system containing three dimensions of mother and baby room accessibility, service quality and humanized design was constructed, and the set of factors and the set of rubrics in fuzzy evaluation were determined. Fuzzy statistical method was used to determine the affiliation degree of each indicator, and principal component analysis was applied to assign weights to the indicators. The results of the study showed that the weight of indication clarity was 0.086 and the satisfaction was 3.173. The weight of distribution extensiveness was 0.107 and the satisfaction was 2.538. The area of internal space, the quality of facilities and security were the dominant indicators of high importance and high satisfaction, and distribution extensiveness, openness and the completeness of facilities were the indicators to be focused on improvement. Under the three-level theory, the emotional design at the instinctive level meets the basic needs of the mother and baby groups by enhancing the environmental quality and improving the signage system. Behavioral level affective design reduces the difficulty of use for mother and baby groups by optimizing the flow design and optimizing the convenience of facilities, and improves the satisfaction level Reflective level affective design enriches the experience of use for mother and baby groups by optimizing the interaction experience and strengthening the privacy, and improves the degree of emotional identity.
Keywords: Fuzzy Comprehensive Judgment; Mother and Baby Room; Satisfaction Index; Principal Component Analysis; Three-Level Theory

1. INTRODUCTION

In today's society, with the improvement of people's living standards

and the change of consumer attitudes, the design of commercial space is no longer limited to meet the basic shopping needs, but focuses more on providing consumers with comfortable, convenient and humanized service experience (Bardak, Seyman, & Temurtaş, 2024; Goyal & Goyal, 2021; Hofmans et al., 2021). With the increasing concern for the rights and interests of mothers and infants, the construction and management of mother and baby rooms in public places has become an important part of the national livelihood issues, and its design and use experience directly affect the well-being of mothers and infants (Santini et al., 2023; Veerkamp & Wright, 2021). However, the current design of mother and baby rooms often suffers from problems such as incomplete facilities and lack of humanization in design, which fails to meet the deep emotional needs of users. Therefore, this study introduces the design concept of three-level theory. This theory divides human feelings into instinctive level, behavioral level and reflective level, with a view to improving the use experience of mother and baby groups, and thus enhancing the attractiveness and competitiveness of commercial spaces (Rathor, Modi, & Saiyad, 2021). Nowadays, many scholars conduct in-depth research on mother and baby room, a special space, that its design should not only meet the basic physiological needs of mothers and babies, but also pay more attention to the emotional experience and satisfaction in the process of use.

Feng, J (Feng, 2021) from the perspective of public space, explored the mother and baby is the main group, through the spatial attributes and the specific types of people, the facilities become a key entry point. Three types of facilities were analyzed from multiple perspectives, and the proposed optimization strategies provide a reference for the future construction of public baby care rooms. Bousssebt provides a higher level of security for parents by monitoring the status of infants in real time. Intelligent equipment can be introduced into the mother and baby rooms, such as wireless monitoring systems, automatic temperature and humidity adjustment devices, etc., which not only improves the functionality of the room, but also allows the parents to keep track of their babies' status and reduce anxiety while shopping or resting. Lasim, O. U.(Lasim, Ansah, & Apaak, 2022) argues that the importance of improving the quality of maternal and infant health data in healthcare facilities is not only about accuracy at the technical level, but also reflects the facility's care and respect for the maternal and infant population. Extending this concept to the design of mother and baby rooms in commercial spaces, affective design has become the key to enhancing the user experience. Zayek, M.

et al.(Zayek et al., 2020) achieved quality improvement in an infant care setting by utilizing the implementation of an improved neonatal premature sepsis calculator. Not only did it improve the accuracy of medical care, but it also demonstrated a deep concern for the health and safety of the newborn. Maternal and infant rooms should be designed with due consideration of privacy, cleanliness, and convenience, which are key factors affecting the user experience (Goyal, Singh, & Dhiman, 2023). Kwak, K., Choi, H., and Hwang, S.(Kwak, Choi, & Hwang, 2021) The study focuses on the development and application of an alternative clinical practice program for labor and delivery rooms and newborn care rooms in a remote, non-face-to-face educational environment, focusing on the emotional needs of the user and the design of the experience, just as it did in the healthcare environment focuses on the specific needs of laboring mothers and newborns, the design of commercial maternity and newborn rooms should be designed to deeply understand and meet the practical needs of the maternal and infant population. This includes providing private breastfeeding spaces, safe and comfortable diaper-changing areas, and an environmental layout that facilitates rest and parent-child interaction (Sasmita, Soemardiono, & Noerwasito, 2020). Through the comprehensive consideration of user demand orientation, emotional resonance, environment creation, as well as convenience and accessibility, a more humanized and intelligent mother and baby room space can be designed to provide a more intimate and thoughtful service experience for the mother and baby groups (Zayek et al., 2020). The study by Santini and other scholars emphasizes the importance of maternal and child health services from the perspective of healthcare professionals, and that an emotionally designed mother and baby room needs to not only An emotionally designed mother and baby room not only needs to satisfy basic physiological needs, such as breastfeeding and diaper changing, but should also pay attention to the psychological and emotional experience of the users, creating a safe, private and warm atmosphere. In terms of location, the mother and baby room should be located in a conspicuous and easily accessible position in the commercial space. A clear signage system is used to ensure that parents are able to find the room quickly by clearly marking it on the staircase signage and floor plans on each level. Such a design reflects the respect and care for the mother and baby groups and reduces the inconvenience and anxiety in the search process (Ekwueme, Eze, & David-Ojukwu, 2023). By continuously optimizing the design and service level of mother and baby rooms, the user experience and emotional connectivity of mother and baby rooms can be significantly

improved, and the design of mother and baby rooms can be promoted to develop in a more humanized and emotional direction. Using the fuzzy comprehensive judgment method, this paper comprehensively analyzes the performance of the use of public mother-and-baby rooms in Dalian, and combines the importance-performance model to construct a satisfaction evaluation system that contains three first-level indicators of mother-and-baby rooms' accessibility, service quality, and humanized design, as well as 11 second-level indicators under them. Fuzzy statistical method was used to determine the degree of affiliation of each indicator, and principal component analysis was used to assign weights to each indicator. Through in-depth exploration of the use characteristics of mother and baby rooms, construction of an emotional design model and comprehensive evaluation, this study will provide theoretical support and practical guidance for the optimal design of mother and baby rooms in commercial spaces (ACMACC et al., 2020). It aims to explore how to trigger users' positive emotional responses through design, not only to meet the basic functional needs, but also to make the mother and baby room a space that touches people's hearts and is full of warmth.

2. CHARACTERISTICS OF THE USE OF MOTHER AND BABY ROOMS IN COMMERCIAL SPACE

2.1 Needs of the Population using Mother and Child Rooms

In order to deeply understand the characteristics of the use of the mother and baby room, we need to pay attention to the needs of its users, and Figure 1 shows the needs of the users of the mother and baby room. The users of mother and baby rooms mainly include mothers and infants, and their needs involve privacy, safety and security, comfort and convenience (Younis et al., 2024). Starting from the needs, the concept of Hierarchy of Needs Theory is introduced to explore the relationship between the humanized design of mother and baby rooms and the needs. Hierarchy of needs theory is one of the theories of humanistic science, and the human needs system is divided into five levels, from physiological, safety, social, and respect needs, all the way to self-actualization needs. The humanized design of mother and baby room needs to satisfy the most basic physiological needs and safety needs of the user group first, such as the basic functional design of breastfeeding and nursing in the mother and baby room and the design of safety and privacy facilities. Then seek a higher level of demand, such as warm indoor environment can make

users feel love and belonging, and then through the humanized design of the mother and baby room, so that the mother and baby groups to obtain a sense of social identity, and ultimately the construction of the mother and baby room to promote the popularity of breastfeeding, so that breastfeeding women to achieve a sense of self-achievement and their own value. These levels of needs require that the design of mother and baby rooms in public places take into account the need to meet the physiological needs of mother and baby groups, but also to meet the psychological and spiritual needs.

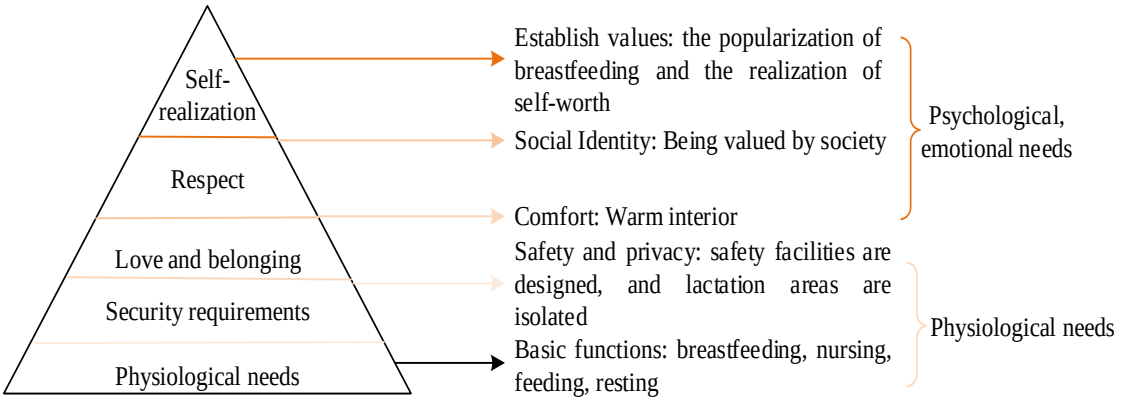

Figure 1: Demand of people using mother and baby rooms

2.2 Factors Influencing the use of Mother and Baby Rooms

The relationship between the factors influencing the use of mother-and-baby rooms is shown in Figure 2, and it is summarized from the research on the influence of the environment on the construction and use of mother-and-baby rooms that the research on the environmental impact of the construction of mother-and-baby rooms has mostly focused on the neighborhood level, while the research on the environmental impact of the use of mother-and-baby rooms has mostly focused on the architectural level, and there is a certain degree of fragmentation at the level of the research. In fact, through the study of the travel characteristics of baby carriers, it can be found that the neighborhood environment affects the travel behavior of baby carriers, determines the choice of travel destinations, and indirectly affects the use of mother-and-baby rooms in the destination, while the environment within the place directly affects the willingness of baby carriers to use mother-and-baby rooms (Agustina; Lasim, Ansah, & Apaak, 2022).

Therefore, this paper, while determining the factors influencing the use of mother and baby rooms based on the previous research, will take into account the demand for the construction of mother and baby rooms and

the travel characteristics of baby-carrying groups, to form a comprehensive and unique research methodology, research ideas, and multifaceted research content covering the neighborhoods and architectural levels.

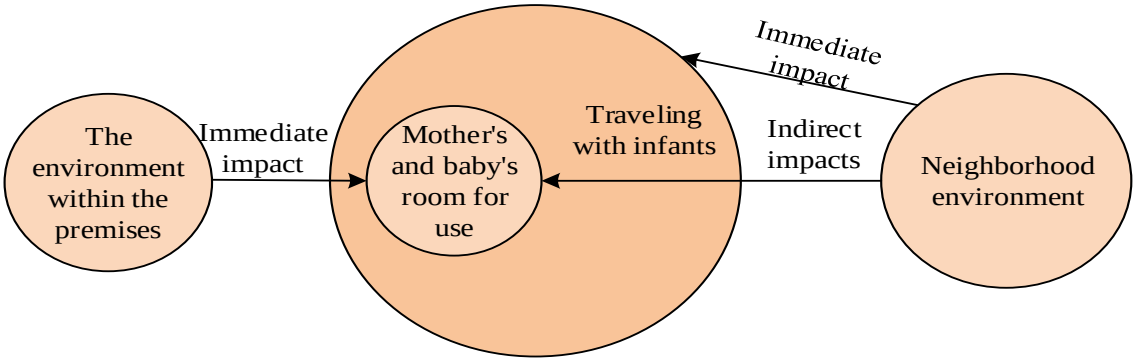

Figure 2: Relationship of Factors Influencing the use of Mother and Baby Rooms

3. EMOTIONAL DESIGN MODEL CONSTRUCTION OF MOTHER AND BABY ROOM IN COMMERCIAL SPACE

3.1 Data Sources

The research object of this paper is the mother and baby room in Dalian, a total of 40 key public places such as airports, railway stations, high-speed rail stations, passenger terminals, subway stations, large hospitals, large shopping malls, parks and other key public places were selected for field research. The target group of the questionnaire survey is mothers in Guangzhou, who are the main audience of the mother and baby room, to understand the actual use of the mother and baby room feelings, listen to the opinions on the construction of the mother and baby room, the satisfaction and feedback on the facilities, environment and services of the room. The questionnaire covers a wide range of aspects such as clarity of signage, wide distribution, degree of openness, and the size of the internal space of the room.

3.2 Determining the Set of Factors and the Set of Rubrics

The fuzzy comprehensive evaluation method is widely used in the evaluation of public service performance This paper uses this method to analyze the use of public mother and baby rooms in a more comprehensive way, combined with the importance-performance model can provide an effective way for the study of public mother and baby facilities (Boussebt et al., 2022). There are many factors affecting the performance of public mother and baby rooms, through literature

research and field visits and interviews, the following performance indicator system for the use of mother and baby rooms was constructed and the set of factors and rubrics in the fuzzy evaluation were determined, and the performance indicator system for the use of mother and baby rooms is shown in Table 1. The evaluation level is set to 5, i.e., the comment set is $V(V_1,V_2,V_3,V_4,V_5)$, very dissatisfied with the assignment of 1 point, not too satisfied with the assignment of 2 points, general assignment of 3 points, more satisfied with the assignment of 4 points, and very satisfied with the assignment of 5 points, and the different levels of the comment can reflect the different degree of satisfaction of mothers on the use of the mother-and-child room in Dalian City.

Table 1: Performance Indicator System for the use of Mother and Baby Rooms

Tier 1 Indicators	**Secondary Indicators**
Indicator X1 on the Accessibility of Mother and Baby Units	Clarity of instructions X1a., Wideness of distribution X1b, Openness X1c
Service Quality of Mother and Baby Rooms X2	Internal space area X2a, sanitary conditions X2b, completeness of facilities X2c, quality of facilities X2d, safety and security X2e
Indicator of Humanized Design of Mother and Baby Rooms X3	Decorative design X3a, comfort X3b, privacy X3c

3.3 Determination of Indicator Affiliation

In this paper, the fuzzy statistical method is selected to determine the degree of affiliation, using the percentage of the number of people belonging to a particular rubric level to the total number of people to determine the degree of affiliation of the indicator relative to the rubric level.

Table 2 shows the affiliation degree corresponding to the performance indicators, and after calculation, it can be obtained that the affiliation degree of the evaluation grade V of the indicator of the degree of accessibility of the mother and baby room X_1, corresponding to the secondary indicators of the degree of clarity of the indication X_{1a}, the degree of wide distribution X_{1b}, and the degree of openness X_{1c}, are {0.058,0.058,0.596,0.231,0.058, {0.135,0.308,0.481. 0.038,0.038}, {0.077,0.192,0.577,0.115,0.038}. The fuzzy relationship matrix R_1 of capacity enhancement X_1 composed by the affiliation of these three indicators, and the corresponding affiliation matrices R_2 and R_3 of other

secondary indicators can be obtained in the same way (Xu et al., 2020).

Table 2: Corresponding Affiliation of Performance Indicators

Norm	V_1	V_2	V_3	V_4	V_5
X_1	0.058	0.058	0.596	0.231	0.058
X_2	0.135	0.308	0.481	0.038	0.038
X_3	0.077	0.192	0.577	0.115	0.038

3.4 Calculation of Indicator Weights

The model test shows that the KMO value is 0.857, and in this paper, we consider choosing the principal component analysis method to assign weights to the various influencing factors of satisfaction with the use of mother and baby rooms (Feng, 2021). The cumulative variance contribution of the three principal components extracted amounted to 78.698%, which can reflect the information of most indicators. The total variance explained is shown in Table 3, which demonstrates the initial eigenvalues, the percentage of variance contributed to the variance % of variance, and the cumulative percentage of variance contributed to the eleven constituent factors influencing the mother and baby rooms in commercial spaces. Of the three principal components extracted, the corresponding eigenvalues are 6.215, 1.329, and 0.583, respectively, which allows the calculation of the weight vector of the first-level indicators as W = (0.2930.4950.212).

These data are usually used in principal component analysis or other factor analysis methods to assess the importance of each component in the data set. It can be seen that the first component has the highest initial eigenvalue of 6.635 and also has the largest percentage contribution to variance of 60.314%, explaining most of the variability in the dataset. The second principal component has the next highest contribution of 12.627% and the first two principal components together explain 72.942% of the variance in the dataset.

As the number of principal components increases, the contribution to variance decreases. For example, the third principal component explains 5.756% of the variance, while the eleventh principal component contributes only 0.523%. The first three components were extracted and their combined eigenvalues, percent contribution to variance and cumulative percent contribution to variance were the same as the initial eigenvalue component. This indicates that these three components are the most important in the dataset and together explain most of the

variability in the dataset.

Table 3: Explaining the Total Variance

Ingredient	Initial Eigenvalue		
	Add up the Total	% of Variance	Cumulative %
1	6.215	60.314	60.314
2	1.329	12.627	72.942
3	.583	5.756	78.698
4	.594	5.399	84.097
5	.488	4.433	88.530
6	.376	3.421	91.950
7	.289	2.624	94.574
8	.280	2.547	97.121
9	.159	1.441	98.562
10	.101	.915	99.477
11	.057	.523	100.000

Table 4 shows the weighted values of the impact indicators of mother and baby rooms, the system consists of three level 1 indicators, the indicator of the accessibility of mother and baby rooms with a weight of 0.293, the indicator of the quality of services of mother and baby rooms with a weight of 0.495, and the indicator of the humanized design of mother and baby rooms with a weight of 0.212, which shows the relative importance of the three aspects in the assessment of mother and baby rooms. Under each level 1 indicator, a number of level 2 indicators were subdivided and given corresponding weights. For the indicator X1 on the accessibility of mother and baby rooms, which includes the clarity of instructions X11, the wide distribution X12 and the degree of openness X13, the weights are 0.294, 0.365 and 0.345, respectively, which reflects the specific considerations of these three aspects when assessing the accessibility of mother and baby rooms.

The service quality indicator X2 of the mother and baby room covers the internal space area X21, hygienic conditions X22, facility completeness X23, facility quality X24, and safety and security X25, with weights of 0.196, 0.182, 0.216, 0.216, and 0.192, respectively, which shows multiple dimensions of the assessment of service quality. Finally, the humanized design indicator X3 of the mother and baby room includes decorative design X31, comfort feeling X32 and privacy X33, with weights of 0.316, 0.392 and 0.292, respectively, which reflects the focus on humanized design.

Table 4: Weighted Values of Impact Indicators for Mother and Baby Rooms

Tier 1 Indicators	Tier 1 Indicator Weights	Secondary Indicators	Weighting Of Secondary Indicators	Final Weighting
Indicator on The Accessibility of Mother and Baby Units (X1)	0.293	Clarity of indication (X11)	0.294	0.086
		Wideness of distribution (X12)	0.365	0.107
		Degree of openness(X13)	0.345	0.101
Indicator of Service Quality of Mother and Baby Rooms (X2)	0.495	Area of internal space(X21)	0.196	0.097
		Hygienic conditions(X22)	0.182	0.09
		Completeness of facilities(X23)	0.216	0.107
		Quality of facilities(X24)	0.216	0.107
		Safety and security(X25)	0.192	0.095
Indicators For The Humanized Design of Mother-and-Child Rooms (X3)	0.212	Decorative design(X31)	0.316	0.067
		Comfortable feeling(X32)	0.392	0.083
		Privacy(X33)	0.292	0.062

3.5 Calculation of a comprehensive value matrix for indicators

The synthesis process of fuzzy weight vector W and fuzzy relation matrix R is shown below:

$$WoR = (W_1, W_2, \cdots, W_n) o \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \vdots & \vdots & \vdots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{np} \end{bmatrix} = (b_1, b_2, \cdots b_p) = B \quad (1)$$

There are four commonly used fuzzy synthesis operators, which are $M(\wedge, V)$ operator, $M(,V)$ operator, $M(\wedge,\oplus)$operator and $M(,\oplus)$operator. Among them, $M(,\oplus)$this synthesis operator firstly reacts the influence of different indicators on satisfaction through multiplication, and then through the bounded sum operation, it synthesizes all aspects of information provided by the fuzzy relationship matrix, which can fully reflect the overall characteristics of satisfaction evaluation. From the perspective of comprehensive evaluation, multiplication and bounded sum operator are more applicable than the other three fuzzy synthesis

operators. So this paper adopts the multiply and bounded sum operator in the empirical evaluation (Cote, Carey, & Bornstein, 2023). Then the evaluation value matrix B_1 of X_1, the synthesized factor is used:

$$B_1 = W_1^{\circ} R_1 = (0.093 \quad 0.196 \quad 0.550 \quad 0.121 \quad 0.044) \tag{2}$$

After calculating the evaluation value matrices for X_2 and X_3 respectively, the affiliation matrix for the second level fuzzy evaluation is formed R, which gives:

$$\mathrm{R} = \begin{pmatrix} 0.093 & 0.196 & 0.550 & 0.121 & 0.044 \\ 0.054 & 0.134 & 0.560 & 0.219 & 0.034 \\ 0.032 & 0.137 & 0.616 & 0.190 & 0.025 \end{pmatrix} \tag{3}$$

This in turn calculates the synthesized evaluation affiliation B:

$$B = W^{\circ} R = (0.061 \quad 0.153 \quad 0.569 \quad 0.184 \quad 0.035) \tag{4}$$

It can be seen that mothers' satisfaction with the use of mother and baby rooms in Guangzhou was 6.1% who thought that they were very dissatisfied, 15.3% who thought that they were not very satisfied, 56.9% who thought that they were average, 18.4% who thought that they were quite satisfied, and 3.5% who thought that they were very satisfied (Fekete, Hodor, & Dai, 2021).

3.6 Satisfaction fuzzy evaluation result vector analysis

The fuzzy evaluation results are subjected to fuzzy vector singularization:

$$c = \frac{\sum_{k=1}^{p} b_k^t c_k}{\sum_{k=1}^{p} b_k^t} \tag{5}$$

Selecting $t = 1$ and $t = 2$ for comparative analysis, respectively, the results were $C_1 = 2.979$ and $C_2 = 3.014$, indicating that the mothers were generally satisfied with the overall use of mother and baby rooms in Dalian.

4. COMPREHENSIVE EVALUATION OF EMOTIONAL DESIGN

The weights of the indicators and the mean value of satisfaction are calculated through the fuzzy comprehensive judgment method, and Table 5 shows the satisfaction of the construction of mother and baby rooms. The weight of the indicator of clarity of instructions is 0.086, which is relatively low, but its satisfaction score is 3.173, indicating that users' experience in this area is relatively good. Clear instructions not only help users find the mother and baby rooms quickly, but also reduce the anxiety and inconvenience in the search process, which enhances the positive emotional experience of users. In contrast, Widely Distributed has a higher weighting of 0.107, but its satisfaction score is only 2.538.

Widely distributed mother and baby rooms mean that users do not have to go too far to find them, increasing convenience and comfort. The lowest scoring indicator in the table of wide distribution indicates that users generally believe that the wide distribution of mother and baby rooms needs to be improved. The weight of the degree of openness is 0.101, and the satisfaction score is 2.846, which belongs to the medium level, indicating that the degree of openness of mother-and-baby rooms basically meets the needs of users, but there is still some room for improvement. The openness of the mother and baby room directly affects the user's experience, and a high openness rate means that users can use it at any time, increasing reliability and trust. Weight of internal space area 0.097, satisfaction 3.000 Sufficient space area is crucial for mother and baby rooms, as it is directly related to users' comfort feeling and privacy. A spacious space can make mothers and babies feel more relaxed and at ease and reduce the sense of crowding, thus enhancing overall satisfaction. Hygienic condition weight 0.090, satisfaction 3.000, hygienic condition is one of the most concerned factors for users, which is directly related to their health and safety. Facility completeness weight 0.107, satisfaction 2.981 and facility quality weight 0.107, satisfaction 3.058, complete facilities and high-quality services are the core of the emotional design of the mother and baby room. These facilities not only meet the basic needs of mothers and babies, such as breastfeeding and diaper changing, but also reflect the meticulous care and respect for users. High-quality facilities further enhance users' experience and satisfaction, with safety and security weighted at 0.095 and satisfaction at 3.192. Safety and security is one of the most important factors that users care about such as installing surveillance cameras and setting up emergency call buttons, which helps to enhance users' sense of trust and security. The weights of internal space, sanitation, completeness of facilities, quality of facilities and security are all high, and the satisfaction scores are all around 3.0, indicating that these aspects are relatively well done, but attention to details is still needed to further improve user satisfaction. The weights of decorative design and comfort are relatively low, but the satisfaction scores are all over 3.0, indicating that users have a better experience in these two aspects. Finally, although the weight of the indicator privacy is not high, the satisfaction score reaches 3.096, which is the highest scoring indicator, indicating that, for example, setting up separate compartments and equipping curtains, etc., which helps to enhance users' sense of trust and security.

Table 5: Satisfaction with the Construction of Mother and Baby Rooms

Indicator	Weighting	Satisfaction
Clarity of Indication	0.086	3.173
Wideness of Distribution	0.107	2.538
Degree of Openness	0.101	2.846
Area of Internal Space	0.097	3.000
Hygienic Conditions	0.090	3.000
Completeness of Facilities	0.107	2.981
Quality of Facilities	0.107	3.058
Safety and Security	0.095	3.192
Decorative Design	0.067	3.077
Comfort	0.083	2.962
Privacy	0.062	3.096

5. OPTIMIZATION DESIGN STRATEGY OF MOTHER AND BABY ROOM BASED ON THREE-LEVEL THEORY

5.1 Emotional Design at the Energy Level

Emotional design at the instinctive level focuses on the basic function and appearance of the mother and baby room, which can be used to meet the basic needs of the mother and baby groups and enhance the experience of use by upgrading the quality of the environment and improving the signage system. In terms of use function, the space of mother and baby room can be divided into several major areas such as milk flushing area, lactation area, rest area, baby parking area, diaper changing area, auxiliary facilities and so on. According to the size of the floor area of the mother and baby room in different commercial spaces, the mother and baby room is reasonably designed in combination with the commercial space under the circumstance of ensuring the completeness of its use function. In the indoor space, in order to improve the space utilization rate of the mother and baby room, designers can carry out secondary transformation of non-load-bearing walls to realize the diversification of wall functions and increase the indoor use area. The color itself does not have a temperature difference between warm and cold, but only the visual color can cause people's mental association, thus making people feel warm and cold. When the baby carriers enter the mother and baby room, will be through the different space color, perceive the emotion expressed by the space. For the baby this particular feeler, mother and baby room color should be bright and vivid, should not create too dark, lighter tone atmosphere. The visual function of infants before four months are vague, after four months slowly perfect, it can distinguish different colors. In the space design of the

mother and baby room should choose more red, orange, yellow and other colors, to protect the healthy development of the baby's eyes. For the wall, floor, lighting and ancillary facilities color matching, should be considered from the whole space inside the mother and baby room to design a mother and baby room with spatial aesthetics. The use of appropriate space color is an important means of creating a good spatial environment. A signage guidance system is a spatial information system designed to convey accurate information through a combination of graphics, text and color. In the signage design of the mother and baby room, the cultural elements of the place can be integrated to create a unique signage design. At the same time, it should also be noted that there is a certain degree of interaction between the signage guidance system and the users. When designing the signage guidance system for mother and baby rooms, the differences between the living backgrounds and physical conditions of different users should be fully taken into account, and attention should be paid to the needs of their physiological and psychological changes in the design, as well as the instinctive reactions triggered by their initial sensory experiences, in order to ensure its effectiveness and the positive Pilot effect in use.

5.2 Emotional Design at the Behavioral Level

The emotional design of the behavioral layer is mainly concerned with the ease of use and comfort of the mother and baby room, which can be optimized by optimizing the flow design, optimizing the convenience of the facilities and strengthening the privacy to reduce the difficulty of use of the mother and baby groups and enhance his satisfaction. In spatial design, flow line design is the core. Mother and baby room space is a flowing space, different users have different behavioral patterns, so we should fully consider the relationship between the various functional partitions. Reasonable dynamic line planning, one can avoid the waste of space in the functional partition, and the other can make the space in the mother and baby room more comfortable and convenient under the premise of ensuring the safety and effectiveness of dynamic line planning. Mother and baby room space design, not only to consider the location of fixed structures and supporting facilities, the width of the aisle, breastfeeding area and the distance between the rest area, but also to consider the number of people. When the number of carriers is too large, in order to avoid overcrowding of the aisle, the width of the aisle should be considered. When baby carriers end up using the mother and baby facilities, it is necessary to consider whether the location of the facilities conflicts with the walking route of the users. Therefore, in the planning of the dynamic

line, the need to achieve a reasonable dynamic and static zoning (Kwak, Choi, & Hwang, 2021). In order to ensure a comfortable and safe environment in the mother and baby room, attention should be paid to the selection and arrangement of relevant supporting facilities. In order to meet the most basic needs, it is necessary to carry out timely maintenance and upgrading of breastfeeding seats, washstands, disinfectant hand sanitizers, nursing desks, garbage cans, safety seats, milk warmers, intelligent consumables cabinets, etc. It is also possible to equip some toys in the safety seats and other areas where infants are active to provide entertainment and improve the interest of the space.

5.3 Emotional Design of the Reflective Layer

Emotional design at the reflective level focuses on the cultural connotation and emotional experience of the mother and baby room, which can be used to enrich the experience of using the mother and baby group and enhance emotional identity by incorporating cultural elements, improving design quality and enhancing emotional interaction. The behavior of using a mother and baby room is an interactive process in which users constantly interact and communicate with the surrounding space. In this process, different individuals will decide whether they need to enter or leave the room according to their own needs, which affects the operation of the equipment in the room and the relationship between the facilities. The functional configuration of the products should be determined according to the physiological characteristics and psychological state of children of different ages. According to the operational needs of mothers, functional partitions should be carefully planned to minimize unnecessary movements, so as to achieve the optimal use of product operation. For example, a mother and baby care table should be set up in a way that is based on the basic movements of a mother caring for a child. When the child is on the nursing table, its lying position should be presented in a positive way facing the mother, which not only facilitates the operation of the mother, but also helps to promote eye-to-eye emotional communication between mother and child. Private space is an environment that can be dominated by people according to their own wishes, which is a reflection of their instinctive needs in space. For example, the milking area is to meet the needs of users to make and warm milk, but baby carriers are not only women, but also men carrying babies out of the phenomenon is not uncommon, so for different genders of baby carriers should be set up different milking area to protect the privacy of users. Private space should not only be able to isolate the outside world, but also to meet the user's

need to selectively interact with others. Breastfeeding room is a necessary area in the design of mother and baby room, and a separate breastfeeding room can effectively protect the privacy of breastfeeding mothers.

6. CONCLUSION

Using the fuzzy comprehensive judgment method, this paper comprehensively analyzes the use of public mother and baby rooms in Dalian, and combines the importance-performance model to provide an effective way to study public mother and baby facilities. Through literature study, fieldwork and interviews, an indicator system of satisfaction with the use of mother and baby rooms containing three primary indicators and 11 secondary indicators was constructed to provide a scientific basis for evaluating the performance of the use of mother and baby rooms. It was found that among the evaluation indicators of satisfaction with the construction of mother and baby rooms, the weights of internal space area, facility quality and safety were 0.097, 0.107 and 0.095 respectively, and the mean values of satisfaction were 3.000, 3.058 and 3.192, which belonged to the dominant zone of high importance and high satisfaction. The weights of openness, completeness of facilities and wide distribution are 0.101, 0.107 and 0.107, respectively, but the mean values of satisfaction are low, 2.846, 2.981 and 2.538, respectively, which is an urgent problem to be solved in building the mother and baby rooms. By introducing the three-level theory, an emotional design study of mother and baby rooms in commercial spaces was conducted. Through in-depth research on the use characteristics and design elements of mother and baby rooms, a scientific emotional design model is constructed, and optimized design strategies are proposed at three levels: instinctive, behavioral, and reflective. In the future, we should continue to strengthen the research and implementation of design and technical specifications related to mother-and-baby rooms, further balance the spatial distribution of mother-and-baby rooms, and achieve the standardization and humanization of the configured facilities, so that while enhancing the use experience of mother-and-baby groups, we can also promote the progress of urban civilization.

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